desired, the computer could reduce waste by optimizing the order in which pieces are produced. It would sequence pieces such that opposing mitered ends are done adjacent to each other as shown in Fig.11. Here the end of work piece 16 is cut adjacent to work piece 47. Numerous other possibilities exist and are obvious to those skilled in the art.

It has been found while implementing this invention that the computer 22 may need to turn off the drive motor 14 before the actual desired position is reached since the roll-forming mechanism does not stop instantly. The amount of 'drift' in a roll-forming machine is dependent on the type and thickness of material being formed, condition and design of the roll-forming section and numerous other variables. A 'drift factor' in the system software accounts for the error. This drift factor may be a programmed constant or may be dynamically adjusted as follows. When the controller turns off the drive motor it continues to monitor the amount of material that has actually moved past the length sensor 6. This is a measure of how much drift this particular machine has. This measurement can be used to modify the drift constant. This procedure can also be used before the end of the work piece is reached. By shutting down the drive motor 14 before the end is reached the computer can measure and adjust the drift factor for that individual work piece. The controller would then restart the drive motor and position the work piece at the proper location using the new drift constant.

It is envisioned that numerous combinations of the features presented in this document could be built. Nor is the invention limited to any particular method of machining the material. It could also be applied to non-metallic work pieces.

I claim:

1. A machine for cutting a profile into flat material and then roll forming that material into the desired cross sectional shape thus avoiding the difficultly of machining a complex cross section. Such machine consisting of:

a. A series of mechanical rollers that act as forming stations by bending the metal into the desired cross section.
b. A drive motor attached to the mechanical rollers that will force the material through the machine.
c. A frame assembly that houses the above components.
d. A cutting means mounted in such a manner to allow it to cut a pattern into the metal in two dimensions.

2. The machine of claim 1 where the workpieces are left attached to each other by small tabs of material.
3. The machine of claim 1 where the workpieces are cut apart from each other.
4. The cutting means of claim 1 that consists of a computer controlled endmill.
    a. A cutting tool where the endmill is powered by an electric motor.
    b. A cutting tool where the endmill is powered by a hydraulic motor.
    c. A cutting tool where the endmill is powered by a pneumatic motor.
5. The cutting means of claim 1 that uses a high pressure water jet.
6. The cutting means of claim 1 that uses a LASER.
7. The cutting means of claim 1 that uses a torch, either plasma or gas.
8. The cutting means of claim 1 where the tool consists of a mechanically activated punch.
    a. A punch that consists of a male and female die for cutting a left angle.
    b. A punch that consists of a male and female die for cutting a right angle.
    c. A punch that cuts any commonly needed shape or hole the material.
9. A mechanical punch of claim 5 that is powered by hydraulic pressure, pneumatic pressure or electrical current.
10. The cutting means of claim 7 where the mechanical punch is activated by the controlling computer.
11. A mechanical punch of claim 5 that is power by a mechanical lever moved by the operator of the machine when prompted by the computer.
12. A device for controlling the operation of a roll forming machine that produces pre-formed ends and other desired cutouts in the workpiece; such a device consisting of:

a. A microprocessor
b. Memory storage
c. Input and output control lines
d. An means for displaying information to the user.
e. A keypad to allow the user to input desired data.
f. A button for activating the motor of claim 1.
g. A button for stopping the motor of claim 1.
h. A length sensor interfaced to the microprocessor for measuring the amount of material formed.
i. A power conversion unit for powering the control device.
j. An enclosure to house the control unit.
k. An on/off switch to control power to the unit.

13. A bypass switch to allow manual operation of the machine if the controller of claim 10 fails.
14. A sensor for measuring the current being drawn by the motor of claim 1.
15. An sensor for detecting the presence of material in the machine.
    a. An optical sensor that detects light.
    b. A magnetic sensor that detects the magnetic field of the material.
16. The cutting tool of claim 2 where the endmill is mounted on a three axis movable assembly allowing the tool to be moved in the X, Y or Z axis.
    a. A movable assembly that uses stepping motors.
    b. A movable assembly that uses servo motors.
    c. A movable assembly that uses hydraulic motors.
    d. A movable assembly that uses pneumatic motors.
17. the cutting mechanism of claim 2 where the endmill is mounted on a two axis movable assembly. One axis perpendicular to the surface of the material being cut (the Z axis) and the other axis parallel to the material and perpendicular to the path through the roll forming machine (the Y axis).
    a. A software algorithm for monitoring the location of the material as it moves through the roll forming stations under power from the drive motor of claim 1. Such an algorithm cuts the desired profile by

positioning the cutting tool of claim 1 in the Y axis and Z axis based on the position of the material in the X axis.

18. A means for controlling the direction of the drive motor of claim 1.
19. A means for monitoring the rotational speed of the cutting tool of claim 2.
    a. A software algorithm for determining the condition of the cutting tool cutting edges based on the rotational speed.
    b. A software algorithm that will reposition the tool in the Z axis to optimize tool life.
    c. A means of notifying the operator of the machine that the tool has become dull.
20. A software algorithm that optimizes the accuracy of the length measurements by compensating for the mechanical momentum of material being formed. Such an algorithm consisting of:
    a. stopping the drive motor of claim 1 before the desired length is reached
    b. measuring how much material passed through before actually stopping
    c. adjust the compensation factors
    d. restarting the motor
    e. stopping the motor based on the new compensation factor such that the exact amount of material desired is formed.
21. A length measurement sensor built into the roll forming machine that consists of:
    a. a decal or other marking means that consists of a series of strips or dots. The decal is mounted to a rotating member of the roll forming machine that moves in time with the material being formed.
    b. A plurality of optical sensors that are mounted 90 degrees out of phase from each other. Such sensors can detect the alternating bands or markings on the decal and generate a quadrature encoded signal.
    c. A decal or other marking means that consists of two series of marks
22. A mechanism that could be attached to an existing roll forming machine. Such attachment would cut a profile into flat material and then feed the material into the roll forming machine which would then roll form that material

into the desired cross sectional shape thus avoiding the difficultly of machining a complex cross section or requiring the user to purchase an entire new machine. Such mechanism consisting of:

a. Brackets that would attach it to the roll forming machine.
b. A guide means that would provide for the smooth transition of material from the cutting mechanism to the roll forming machine.
c. A cutting means mounted in such a manner to allow it to cut a pattern into the metal in two dimensions.
d. A frame assembly that houses the above components.

23. A software algorithm that optimizes the order in which workpieces are machine in order to reduce waste.

Timothy G. Gilbert 11/19/03

Signature Date

Timothy G. Gilbert
125 Stearman Court
Erie, CO 80516